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Substance-Use Outcomes at 18 Months Past Baseline: The PROSPER Community-University Partnership Trial

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Abstract

Background—The study's objective was to examine the effects of “real world,” community-based implementation of universal preventive interventions selected from a menu, including effects specific to higher- and lower-risk subsamples.

Setting/Participants—The study included twenty-eight public school districts in Iowa and Pennsylvania that were located in rural towns and small cities, ranging in size from 6975 to 44,510. Sixth and seventh graders in these school districts participated in the study.

Design—School districts were selected on size and location and then randomly assigned to a control condition or to an experimental condition in a cohort sequential design.

Intervention—Community teams were mobilized; each team implemented one of three evidence-based, family-focused interventions (5–12 sessions) and one of three evidence-based school interventions (11–15 sessions)—for 6th and 7th graders, respectively. Observations showed interventions were implemented with fidelity.

Main Outcome Measures—Outcomes included student reports of past month, past year, or lifetime use of alcohol, cigarettes, marijuana, methamphetamines, ecstasy, and inhalants, as well as indices of gateway and illicit substance initiation, at pretest and at a follow-up assessment 1½ years later.

Results—Intent-to-treat analyses demonstrated significant positive effects on substance initiation (marijuana, inhalants, methamphetamines, ecstasy, gateway index, illicit use index), as well as past year use of marijuana and inhalants, with positive trends for all substances measured. For three outcomes, intervention effects were stronger for higher-risk students than lower-risk students.

Conclusions—Community-based implementation of brief universal interventions designed for general populations has potential for public health impact by reducing substance use among adolescents.

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INTRODUCTION

Substance use among adolescents is a major public health problem, with substantial health, social, and economic consequences. National surveys show continuing high rates of adolescent alcohol, tobacco, marijuana, and other illicit drug use that constitute a major cause of morbidity and mortality.¹ Forty-one percent of 8th graders report lifetime alcohol use, 25.9% cigarette use, and 16.5 % marijuana use. The use of illicit “hard” drugs is especially of concern; 12.1% of eighth graders report lifetime illicit drug use, other than marijuana. Among illicit drugs, methamphetamine use continues to be a problem, with 3.1% of 8th graders reporting lifetime use. The public health-related consequences of adolescent substance use are well documented and include adverse affects on both mental and physical health,^{2–6} with substantial economic costs.^{7–8}

Preventable factors and conditions that contribute to adolescent use have been treated thoroughly in the literature.⁹ Because so many risk and protective factors in adolescent substance use have their origin in family and school environments, a number of universal preventive interventions have been designed with components that specifically target those factors. Universal interventions (those that target general populations) are particularly suitable for addressing the public health challenge represented by adolescent substance use;¹⁰ earlier outcome research demonstrates their promise in terms of longitudinal, community-level outcomes and economic benefits.¹¹

A number of researchers have argued that a major barrier to public health impact of universal interventions is a lack of rigorous effectiveness studies of those interventions.¹² Effectiveness studies examine outcomes when interventions are implemented under conditions approximating “real world” circumstances, including community-based implementation that often utilizes community-based partnerships and teams.^{13–14} This stands in contrast to efficacy studies, which are typically conducted under highly controlled conditions that are designed to assure strong internal validity.¹⁵ There has been, however, only very limited experimental study of long-term substance use outcomes in the context of effectiveness trials. No effectiveness trials of evidence-based, multicomponent family and school interventions selected from a menu could be found. The present study addresses this gap.

This study reports adolescent substance use outcomes from a community-based universal intervention effectiveness trial called PROSPER (PROmoting School-community-university Partnerships to Enhance Resilience). PROSPER utilizes the land grant university outreach arm—the Cooperative Extension System—to mobilize and sustain community-based teams in local communities that implement evidence-based programs, as described in more detail below. We hypothesized that intervention group substance use rates would be significantly lower than those in the control group at 1½ years past baseline—one year following PROSPER project implementation of a family-focused intervention in 6th grade and a *minimum* of several weeks following PROSPER project implementation of a school-based intervention in 7th grade, as further described in the methods section. This paper examines the partnership-based intervention effects on initiation, past month, and past year substance use.

Positive results from earlier analyses of proximal mediating variables¹⁶ supported the expectation of favorable intervention-control differences on substance use rates and, moreover, suggested that respondents to survey questionnaires were not simply motivated to underreport substance-using behaviors. For example, analyses showed significantly better parenting practices by parents in intervention communities, as well as improved, more cohesive family environments. Targeted adolescent competencies also showed significant intervention effects (e.g., higher substance refusal efficacy).

In addition to examining intervention-control differences, this study examined whether students who already had initiated cigarette, alcohol, or marijuana use at pretest (the higher-risk subsample) showed stronger intervention effects than students who had not initiated use (lower-risk). Across a wide range of risk-related variables examined in earlier studies,^{17–19} very few significant risk moderation effects have been found, but when observed, they have indicated greater benefit to higher-risk subgroups.^{17–19} Risk moderation effects are defined as those occurring when one risk-related subsample of intervention group participants shows significantly stronger effects than another. Thus, it also was hypothesized that there would be either no evidence of risk moderation or, if observed, risk moderation would favor the higher-risk subsample.

SUBJECTS AND METHODS

Community Selection and Assignment

The project recruited 28 school districts from Iowa and Pennsylvania and utilized a cohort sequential design involving two cohorts (designated Cohort 1 and Cohort 2). Initial eligibility criteria for communities in the study were: (a) school district enrollment between 1300 and 5200 students, and (b) at least 15% of students eligible for free or reduced cost school lunches. Communities were blocked on school district size and geographic location; they were randomly assigned to the partnership intervention and “normal programming” comparison conditions. At the beginning of the project, participants in each cohort were sixth graders and their families. Community and participant recruitment procedures are comprehensively described in an earlier published report.²⁰ Figure 1 summarizes sample tracking over the three waves of data collected. The participating universities’ Institutional Review Boards authorized the study procedures before recruitment began.

Partnership Model

A three-component community-university partnership model guided the implementation of evidence-based interventions (EBIs), as described in detail previously.^{21, 22} The three components of the PROSPER model consist of local community teams, state-level university researchers, and a Prevention Coordinator team in the land grant university Cooperative Extension System. Prevention Coordinators served as liaisons between the community-based teams and university researchers, providing continuous, proactive technical assistance to the community teams. Community teams were comprised of a Cooperative Extension staff team leader, a public school representative co-leader, and representatives of local human service agencies, along with other local community stakeholders (e.g., youth and parents).

Following team formation, local team activities included the selection of a universal family-focused program from a menu of three EBIs. The rationale for providing teams with a menu from which to select EBIs is that such a selection process allows community-based input and decision-making and, thereby, allows them to optimize the “goodness of fit” between the EBIs and local needs or preferences for intervention implementation. Also, this is a more naturalistic process; having a range of intervention options from which to choose is common for communities.

Although they were provided with three program choices, all 14 community teams chose the seven-session Strengthening Families Program: For Parents and Youth 10–14 (SFP 10–14). They then recruited families of 6th graders into the intervention, implementing it during the first of two years of “core” program implementation for each of the two successive cohorts of students (“core” refers to the first year, basic program implementation with a given cohort, preceding elective booster sessions for each program with the same cohort in the following year). During the second year of program implementation in the project, teams were presented

with a menu of three school-based EBIs (*All Stars*, *Life Skills Training*, and *Project Alert*) and asked to select one of them to implement with 7th graders. *Life Skills Training* and *Project Alert* were selected by four teams; *All Stars* was selected by six. The core school-based interventions were then administered with the first cohort of students. During this second year of program implementation intervention communities also electively implemented booster sessions for the family-focused intervention (booster sessions for school-based programs were electively conducted the year following core program implementation). The PROSPER programming model and its various functional roles are described more thoroughly in an earlier article.²¹

Family and School Interventions

The Strengthening Families Program: For Parents and Youth 10–14²³ is based upon empirically-supported family risk and protective factor models.^{24–26} Goals of the seven-session *SFP 10–14* include the enhancement of parental skills in nurturing, limit-setting, and communication, as well as youth prosocial and peer resistance skills. Each session includes a separate, concurrent 1-hour parent and youth skills-building curriculum, followed by a 1-hour family curriculum during which parents and youth practice skills learned in their separate sessions together. A detailed description of program content can be found at www.extension.iastate.edu/sfp/.

A total of 1064 families (approximately 2650 family members) attended at least one session of *SFP 10–14* in 142 groups in the 14 schools assigned to the intervention condition, representing 17% of all eligible families. Notably, attendance was predicted by level of community team functioning and technical-assistance related variables (e.g., effective collaboration with technical assistants).²⁰ Recruitment strategies and incentives designed to encourage participation included: an *SFP 10–14* promotional video and informational displays used at parent-teacher conferences, phone and mail invitations to individual families, classroom presentations, announcements in school newsletters, community distribution of promotional items, and participation incentives (e.g., \$10 family gift, door prizes, a \$3 youth gift for each session attended).

Of the 1064 families in attendance, 90% attended at least four sessions and 63% attended six or more sessions. Group sizes ranged from three to 15 families (an average group size of 7.5 families and an average of 20 individuals per session). Facilitators were selected by local teams; they were wide-ranging in background and included parents, teachers, counselors, and law enforcement personnel, among others. All facilitators received a 2-day training by certified *SFP 10–14* trainers. Each team of program facilitators was observed two or three times to assess their adherence to the intervention protocol. Across both cohorts, coverage of the component tasks or activities described in the group leader's manual showed an average coverage of 92% in the family sessions, 88% in the parent sessions, and 91% in the youth sessions.

Each of the school-based interventions was implemented during class periods. Information on their theoretical approach, duration, and objectives follows; more detail on their implementation can be found in an earlier published report.²⁷

Life Skills Training^{28,29} is a 15-lesson universal preventive intervention program with a design guided by social learning theory³⁰ and problem behavior theory.³¹ The primary goals of LST are to promote skill development (e.g., peer resistance, self-management, general social skills) and to provide a knowledge base concerning the avoidance of substance use.³²

Project ALERT is an 11-session program based on the social influence model of prevention.^{30,33,34} It has three objectives: (1) to change students' beliefs about substance use norms, as well as the social, emotional, and physical consequences of using substances; (2) to help

students identify and resist prosocial substance use pressures from peers, the media, parents and others; and (3) to build resistance self-efficacy.

Like the *Life Skills Training* program, *All Stars* is based on social learning theory³⁰ and problem behavior theory.³¹ It is a 13-session program with four objectives: (1) to influence students' perceptions about substance use and violence; (2) to increase the accuracy of students' beliefs about peer norms regarding substance use and violence; (3) to have students make a personal commitment to avoid substance use and violent behavior; and (4) to increase student school bonding.³⁵

Trained observers monitored selected classroom lessons in the participating schools for all school-based programs. Across both cohorts, the implementation adherence rates for LST, Project Alert, and All Stars were 89%, 89%, and 91%, respectively.²⁷

Data Collection

Data were collected between 2002 and 2005 via machine-scored pencil and paper questionnaires administered in school during class sessions by trained university-based data collectors. Students were assured of the confidentiality of their reports and that the individual information they provided would not be seen by parents or school administrators. Pretest assessments were conducted during the fall semester of 6th grade for each cohort of students. The post-intervention follow-up assessments for the two cohorts were conducted at 1.5 years past baseline and began several weeks after all programming during the second year of implementation had been completed. Community teams in the intervention condition implemented the family-focused intervention during the Spring semester that followed the Fall semester pretest. They implemented the chosen school-based intervention at some point during the following Fall and/or Spring semester. It is noteworthy that there was considerable variation in the timing and delivery structure of the school-based interventions (e.g., different groups of students received the program at different times of year), so that data collection was not immediately following intervention, at least for most students. On average, 88% of all eligible students completed assessments at each data collection point.

Measures

Prior studies have reported the use of similar substance use measures and indices to those in the current study.^{36, 37} Although self-report measures may be susceptible to social desirability biases, previous work has supported the validity of substance use self-reports.^{38–40} All of the individual substance use items were answered using a yes/no format and coded as “1” for *yes* and “0” for *no*.

Substance Initiation Index-Gateway—The Substance Initiation Index-Gateway (SII-G) consists of three lifetime substance use items: (a) “Have you ever had a drink of alcohol”; (b) “Have you ever smoked a cigarette”; and (c) “Have you ever smoked marijuana (grass, pot) or hashish (hash),” scored from 0–3.

Substance Initiation Index-Illicit—The Substance Initiation Index-Illicit (SII-I) consists of five lifetime substance use items that ask “Have you ever...”: (a) “used methamphetamine (meth)” (b) “used ecstasy (MDMA)” (c) “smoked marijuana (grass, pot) or hashish (hash)” (d) “used drugs or medications that were prescribed by a doctor for someone else” and (e) “used Vicodin, Percocet, or Oxycontin,” scored from 0–5. (Footnote: For the initiation indices and all individual lifetime use measures, students were scored “0” until the time at which they first reported use and “1” thereafter. For example, a student reporting lifetime use at the baseline assessment, but no such use at the follow-up assessment was still considered to have initiated use at baseline).

New user measures—For all individual initiation measures, “new user” rates were calculated to control for baseline rates, based only on those students who did not report lifetime use of a substance at the baseline assessment. The seven new user measures assessed drinking alcohol, drunkenness, cigarette use, marijuana use, inhalant use, methamphetamine use, and ecstasy use.

Past month and past year use measures—There were five dichotomous measures of “current” use. These included two past month items (for substances used at relatively higher frequency rates—alcohol and cigarettes) and three past year items: drunkenness, marijuana, and inhalant use. (Footnote: The survey included past month and past year items for drunkenness and marijuana use. Due to small past month prevalence rates, however, only past year measures were analyzed in the current study. Similarly, the survey included an item assessing the use of methamphetamine in the past year, but the rate was less than 1% so this item was not analyzed).

Analyses

Multilevel model (two level—school and individual) analyses of covariance using SAS PROC MIXED 9.1.3 (SAS Institute, Inc., Cary, NC, 2003) were applied to the index outcomes; the SAS GLIMMIX macro procedure was used for all dichotomous outcomes. State, cohort, block, and risk status were included as factors in the model at the school-level, as were all corresponding interaction terms. One individual-level covariate, general child management, also was included in the model. General child management addresses basic parenting practices (monitoring, consistent discipline) and was assessed by 13 items on the student questionnaires ($\alpha = 0.73$), it was added because of its relevance to a wide range of child problem behaviors, including substance use. All analyses here are intent-to-treat analyses and thus include all youth on which data were collected. Although intent-to-treat analyses may not provide accurate estimates of the magnitudes of effects that a particular intervention produces on those who receive the intervention as designed,^{41,42} this type of analysis is still considered to be the first step in an unbiased evaluation of an intervention⁴¹ and was selected for application here for that reason. Final outcome analyses were conducted in 2006.

RESULTS

Pretest Equivalence

Pretest equivalence of the two conditions on sociodemographics and outcome measures was assessed. There was no evidence of inequivalence on any sociodemographic measure (biological parents, target gender, age, grades, school absence, race, free school lunch) or on the 14 outcome measures.

Differential Attrition

Analyses were conducted to rule out differential attrition by examining condition by dropout status interactions with the outcome variables at the pretest assessment. No significant attrition $\times$ condition interactions were found.

Substance Initiation

Substance Initiation Indices—Young adolescents in the PROSPER intervention condition were compared with those in the control condition using the multilevel ANCOVA analyses, as summarized in Table 1. At the 7th grade follow-up, 1½ years past baseline, results showed that both the SII-G and SII-I scores for the intervention group were significantly lower than those for the control group.

Individual initiation measures—Results showed that the new user rates of marijuana, methamphetamine, ecstasy, and inhalant use were significantly lower for the intervention group. In addition, drunkenness and cigarette use among intervention group adolescents were lower than in the control group, but significant only at the .10 level.

Past Month and Past Year Use

Past year marijuana and inhalant use were significantly lower in the intervention condition. Also, lower proportions of intervention-condition adolescents reported drunkenness in the past year and cigarette use in the past month; but these results only approached statistical significance ($p < .10$).

Differential Effects by Risk Status

Risk status-related subsamples were created based on SII-G scores at pretest; those scoring $\geq$ “1” (those who had initiated cigarettes, alcohol, or marijuana at that time) were designated as higher-risk (a risk score of “1”), while those scoring “0” (no initiation of cigarettes, alcohol, or marijuana at that time) were designated as lower-risk (a risk score of “0”).

For each outcome, intervention-control differences for use rates in the higher-risk subgroup were greater than those for the lower-risk subgroup, but risk moderation effects did not reach statistical significance for any individual new user rates.

Results for the two substance initiation indices were significant, however, indicating a stronger intervention effect for the higher-risk subsample in both instances. For SII-G, mean scores for the intervention and control groups were 1.430 (s.e. = 0.030) and 1.552 (s.e. = 0.030), respectively, for higher risk adolescents and 0.554 (s.e. = 0.025) and 0.570 (s.e. = 0.025), respectively, for the lower risk adolescents, with a statistically significant risk moderation effect ($F_{1,12} = 5.71$, $p < .05$). For SII-I, mean scores for the intervention and control groups were 0.331 (s.e. = 0.024) and 0.448 (0.025), respectively, for higher risk adolescents and 0.185 (s.e. = 0.020) and 0.220 (s.e. = 0.020), respectively, for the lower risk adolescents, also with a statistically significant risk moderation effect ($F_{1,12} = 5.71$, $p < .05$).

Risk moderation effects were significant for one other outcome, past month cigarette use ($F_{1,12} = 626$, $p < .05$), also with larger intervention-control differences among the higher risk group; means for the intervention and control groups were 10.8% (s.e. = 0.012) and 16.2% (s.e. = 0.016), respectively for higher risk adolescents and 4.0% (s.e. = 0.005) and 4.1% (s.e. = .005), respectively for the lower risk adolescents.

DISCUSSION

This study examined substance use outcomes when community-based teams implement evidence-based family and school interventions. Analyses of effects showed evidence of intervention-control differences on a range of substance initiation and current use measures. Three features of the interventions producing these results are noteworthy. First, the design of these interventions followed research-based principles and met criteria for evidence of efficacy, suggested by current literature.³⁶ Second, the community teams were required to choose a combination of one family-focused and one school-based intervention from a menu of evidence-based interventions. With this combination of interventions, a range of empirically-supported family-, school-, and peer-related etiological factors for substance use were addressed.⁹ Third, the interventions were implemented under “real world” conditions, consistent with an effectiveness trial.¹⁵ A critical element of this model is the provision of regular and proactive technical assistance for the community team implementation through the land grant university based Cooperative Extension System. The use of this system and active

technical assistance are key features of the PROSPER model that is intended for future dissemination to other communities.^{21,22}

The range of substances on which positive effects were observed also is noteworthy. The interventions were designed to impact substance use by intervening with etiological risk and protective factors that were expected to influence substance use generally, independent of the specific type of substance in question. Thus, intervention content was not substance specific. Nonetheless, there were statistically significant effects on a broad range of substances, from frequently used gateway substances to substances used at lower rates in the general population, like methamphetamines, inhalants, and ecstasy.

Concerning the practical significance of effects, the relative reduction rates for marijuana, methamphetamine, and ecstasy initiation are especially noteworthy. For example, the initiation rate of marijuana use was 40% lower in the intervention group than among controls. This suggests that for every 100 non-intervention, general population adolescents who begin using marijuana, only 60 intervention group adolescents would do so over the same period. In addition, effect sizes were primarily in the moderate range when calculated at the community-level, as is most consistent with the intent-to-treat analytic design and most directly relevant to the assessment of community-level public health impact.

The real world conditions under which the present effectiveness trial was conducted also are important in interpreting the practical significance of the results. Showing positive results under such conditions can be expected to be particularly difficult when conducting a rigorous assessment of community-level outcomes using intent-to-treat analysis. Under these conditions, the lower degree of researcher control over such factors as program recruitment could easily lead to weaker community-level effects. Nonetheless, in the current study, with intervention implementation driven by the local teams, intervention participation (17% of the general population families targeted, in the case of the family-focused intervention) and program fidelity were sufficiently high to produce significant reductions in adolescent substance use. In other words, these results are of greater relevance for typical community-based prevention practice than results from an efficacy trial conducted under artificially well-controlled circumstances. A number of barriers to widespread dissemination concern resource demands for sustained quality implementation of evidence-based preventive interventions, including the requisite human and financial capacity for this type of implementation. For example, implementing the *SFP 10–14* for a group of 8–10 families costs approximately \$3,000. The per group costs may be higher or lower, depending upon the hourly wage rate for staff, the level of participation incentives used, and what elements of the program were donated (for example, food). The PROSPER partnership model is designed to address the costs of *SFP 10–14* implementation and other resource issues in two ways. First, sustainability training is central to the PROSPER model. This sustainability training is substantial, starts early on, and focuses on sustaining both effective community team functioning over time and quality program implementation, including training in local fundraising. As of this writing, all community-teams have continued to operate and each has garnered sustainability funding to continue both the family and school programs in their communities.

Second, PROSPER addressed human resource barriers to sustainability through its design as a hybrid of other types of community-based programming models, a hybrid that is grounded in a stable human resource system. As described in an earlier report²⁰, one type of model involves no university-based research staff and another model entails paid research staff that are directly and extensively involved. The PROSPER model consists of community-based implementation by a local community team, consisting mostly of local community volunteers who have primary responsibility for implementation. As described earlier, support for community team implementation efforts is provided by technical assistants with prevention

programming expertise. This technical assistance is based in a stable system (the Land Grant University Cooperative Extension System) that provides resources extending beyond research grant funding. Thereby, the PROSPER model addresses both financial and human resource barriers to widespread implementation.

Unlike the authors' prior prevention trials, there were no effects on alcohol initiation. Earlier studies have suggested that effects on alcohol initiation are observed primarily when the intervention is implemented sufficiently early in the phase during which young adolescents are experimenting with use.^{43, 44} Unfortunately, in PROSPER the base rates of alcohol initiation in 6th grade were higher than expected and may have suppressed the intervention effect on that outcome. Indeed, most of the significant initiation effects were observed for substances with lower base rates. Notably, on the one alcohol intervention outcome with a relatively lower base rate (drunkenness) relatively more positive results were observed.

Consistent with earlier reports, we found comparable intervention effects among lower-and higher-risk subsamples or, in some cases, stronger effects for higher-risk youth.^{18,19} This pattern of findings across studies is important in that it counters the common speculation that universal interventions often benefit only those in the general population at lower risk.¹⁰ The present findings highlight how universal strategies can provide an avenue for reaching at least some higher-risk youth, while avoiding iatrogenic effects sometimes observed when high-risk youth are grouped together for intervention.⁴⁵ Most importantly, results indicating comparable or stronger benefits for higher-risk youth show how a community-based approach like the one tested can address the needs of that segment of the community youth population.

The reader should be cognizant of several limitations of the current study. First, although it was conducted in two states and included diverse communities with a range of populations, the largest community was approximately 44,500 in population (with the smallest being approximately 7,000) and the participants were primarily Caucasian. It is not entirely clear to what extent the PROSPER model results would generalize to students in larger metropolitan areas and non-white populations; further research with such populations will be required to assess generalizability of the findings. Second, all of the substance use measures are based on self-report; this could introduce some bias into the reporting, although there is support in the literature for the validity of this type of data.^{38–40,46}

Addressing the health and economic consequences of adolescent substance use noted in the introduction requires diffusion of effective community-based, empirically-supported interventions; community-based partnership approaches have been highly recommended for this purpose.^{17,22,47,48} The significant differences in levels of substance use across several different measures for the intervention group as compared with a control group—differences that past research^{17,36} suggests will increase over time—are especially noteworthy in light of this recommendation for community-university partnerships.^{22,47} Thus, the findings suggest that the PROSPER partnership model for sustained quality implementation of evidence-based interventions by communities has public health potential and warrants further research.

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REFERENCES

1. Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. Teen drug use down but progress halts among youngest teens. University of Michigan News and Information Services; Ann Arbor, MI: [02/14/06]. [On-line]. Available: www.monitoringthefuture.org. Retrieved December 19, 2005
2. Mason WA, Hitchings JE, Spoth R. Emergence of delinquency and depressed mood throughout adolescence as predictors of late adolescent problem substance use. *Psychol Addict Behav*. In Press.
3. Windle M, Windle RC. Depressive symptoms and cigarette smoking among middle adolescents: Prospective associations and intrapersonal and interpersonal influences. *J Consult Clin Psychol* 2001;69:215–226. [PubMed: 11393599]
4. Rawson RA, Anglin MD, Ling W. Will the Methamphetamine Problem Go Away? *J Addict Dis* 2002;21:5–19. [PubMed: 11831500]
5. Kosterman R, Hawkins JD, Abbott RD, Hill KG, Herrenkohl TI, Catalano R. Measures of positive adult behavior and their relationship to crime and substance use. *Prev Sci* 2005;6:21–33. [PubMed: 15766003]
6. Kaestner R. The effect of illicit drug use on the wages of young adults. *J Labor Econ* 1991;9:381–412.
7. Harwood HJ, Fountain D, Livermore G. Economic cost of alcohol and drug abuse in the United States: A report. *Addiction* 1999;94:631–635. [PubMed: 10563025]
8. Pacific Institute for Research and Evaluation. *Costs of underage drinking* [Electronic version].. Presented at the Office of Juvenile Justice and Delinquency Prevention National Leadership Conference; Washington, DC. Jul. 1999 Available [On-line]: www.pire.org/udetc/documents/costs.pdf
9. Romer, D., editor. *Reducing adolescent risk: Toward an integrated approach* (Preface). Sage; Thousand Oaks, CA: 2002.
10. Offord DR, Kraemer HC, Kazdin AE, Jensen PS, Harrington R. Lowering the burden of suffering from child psychiatric disorder: Trade-offs among clinical, targeted, and universal interventions. *J Am Acad Child Adolesc Psych* 1998;37:686–694.
11. Spoth RL, Kavanagh K, Dishion T. Family-centered preventive intervention science: Toward benefits to larger populations of children, youth, and families. *Prev Sci* 2002;3:145–152. [PubMed: 12387551]
12. Glasgow RE, Klesges LM, Dziewaltowski DA, Bull SS, Estabrooks P. The future of health behavior change research: What is needed to improve translation of research into health promotion practice? *Ann Behav Med* 2004;27(1):3–12. [PubMed: 14979858]
13. Butterfoss FD, Goodman RM, Wandersman A. Community coalitions for prevention and health promotion: Factors predicting satisfaction, participation, and planning. *Health Educ Quart* 1996;23:65–79.
14. Minkler, M.; Wallerstein, N., editors. *Community-Based Participatory Research for Health*. Jossey-Bass; San Francisco: 2002.
15. Flay BR, Biglan A, Boruch RF, Castro FG, Gottfredson D, Kellam S, Moscicki EK, Schinke S, Valentine JC, Ji P. Standards of evidence: Criteria for efficacy, effectiveness and dissemination. *Prevention Science Online*. 2005 COI: 10.1007/s11121-005-5553-y.
16. Redmond, C.; Spoth, R.; Shin, C.; Schainker, L.; Greenberg, M. Proximal outcomes of an evidence-based universal family-focused intervention implemented by community teams. 2006. Manuscript under review
17. Spoth R, Redmond C. Project Family prevention trials based in community-university partnerships: Toward scaled-up preventive interventions. *Prev Sci* 2002;3:203–221. [PubMed: 12387555]
18. Guyll M, Spoth RL, Chao W, Wickrama KAS, Russell D. Family-focused preventive interventions: Evaluating parental risk moderation of substance use trajectories. *J Fam Psychol* 2004;18:293–301. [PubMed: 15222836]
19. Spoth R, Shin C, Guyll M, Redmond C, Azevedo K. Universality of effects: An examination of the comparability of long-term family intervention effects on substance use across risk-related subgroups. *Prev Sci* 2006;7:208–224.
20. Spoth R, Clair S, Greenberg M, Redmond C, Shin C. Toward dissemination of evidence-based family interventions: Maintenance of community-based partnership recruitment results and associated factors. *J of Fam Psychol*. In press.

21. Spoth R, Greenberg M, Bierman K, Redmond C. PROSPER community-university partnership model for public education systems: Capacity-building for evidence-based, competence-building prevention. *Prev Sci* 2004;5:31–39. [PubMed: 15058910]
22. Spoth RL, Greenberg MT. Toward a comprehensive strategy for effective practitioner-scientist partnerships and larger-scale community benefits. *Am J Community Psychol* 2005;107–126. [PubMed: 15909789]
23. Molgaard, VM.; Kumpfer, K.; Fleming, E. Strengthening Families Program for Parents and Youth 10-14: A video-based curriculum. Institute for Social and Behavioral Research; Ames, IA: 1997.
24. DeMarsh, JP.; Kumpfer, KL. Family-oriented interventions for the prevention of chemical dependency in children and adolescents.. In: Griswold-Ezekoye, S.; Kumpfer, KL.; Bukowski, WJ., editors. *Childhood and chemical abuse: Prevention and intervention*. Haworth Press; New York, NY: 1986. p. 117-151.
25. Kumpfer, KL.; Molgaard, V.; Spoth, R. The Strengthening Families Program for the prevention of delinquency and drug use.. In: Peters, RD.; McMahon, RJ., editors. *Preventing childhood disorders, substance abuse, and delinquency*. Thousand Oaks, CA: 1996. p. 241-267.
26. Molgaard, VM.; Spoth, R.; Redmond, C. *OJJDP Juvenile Justice Bulletin* (NCJ 182208).. U.S. Department of Justice, Office of Juvenile Justice and Delinquency Prevention; Washington, DC: 2000. Competency training: The Strengthening Families Program for Parents and Youth 10-14..
27. Spoth R, Guyll M, Lillehoj CJ, Redmond C, Greenberg M. PROSPER study of evidence-based intervention implementation quality by community-university partnerships. *J of Comm Psychol*. In press.
28. Botvin, GJ. Life Skills Training. Princeton Health Press; Princeton, NJ: 2000.
29. Botvin, GJ. Life Skills Training and the prevention of adolescent drug abuse.. In: Clark, D., editor. *Preparing Youth for the 21st Century*. The Aspen Institute; Washington, DC: 1996.
30. Bandura, A. Social learning theory. Prentice Hall; Englewood Cliffs, NJ: 1977.
31. Jessor, R.; Jessor, SL. Problem behavior and psychosocial development: A longitudinal study of youth. Academic Press; New York: 1977.
32. Botvin GJ, Baker E, Renick NL, Filazzola AD, Botvin EM. A cognitive-behavioral approach to substance abuse prevention. *Addict Behav* 1984;9:137–147. [PubMed: 6611026]
33. Rosenstock IM, Strecher VJ, Becker MH. Social learning theory and the Health Belief Model. *Health Educ Quart* 1988;15:175–183.
34. Bandura, A. Social foundations of thought and action: A social cognitive theory. Prentice-Hall; Englewood Cliffs, NJ: 1986.
35. Hansen, WB. Prevention programs: What are the critical factors that spell success?. Plenary Session presented at the NIDA National Conference on Drug Abuse Prevention Research; Washington, DC. 1996;
36. Spoth R, Redmond C, Shin C. Randomized trial of brief family interventions for general populations: Adolescent substance use outcomes four years following baseline. *J Consult Clin Psychol* 2001;69:627–642. [PubMed: 11550729]
37. Spoth R, Randall GK, Shin C, Redmond C. Randomized study of combined universal family and school preventive interventions: Patterns of long-term effects on initiation, regular use, and weekly drunkenness. *Psychol Addict Behav* 2005;19:372–381. [PubMed: 16366809]
38. Elliott, DS.; Ageton, SS.; Huizinga, D.; Knowles, BA.; Canter, RJ. The prevalence and incidence of delinquent behavior: 1976-1980. Behavioral Research Institute; Boulder, CO: 1983.
39. Smith GT, McCarthy DM, Goldman MS. Self-reported drinking and alcohol-related problems among early adolescents: Dimensionality and validity over 24 months. *J Stud Alcohol* 1995;36:383–394. [PubMed: 7674672]
40. Williams CL, Perry CL, Dudovitz B, Veblen-Mortenson S, Anstine PS, Komro KA, Toomey TL. A home-based prevention program for sixth-grade alcohol use: Results from Project Northland. *J Prim Prev* 1995;16:125–147.
41. Ellenberg JH. Intent to treat analysis versus as-treated analysis. *Drug Info J* 1996;30:535–544.
42. Shiener LB. Is intent-to-treat analysis always (ever) enough? *British J Pharmacology* 2000;54:203–211.

43. Spoth R, Redmond C, Lepper H. Alcohol initiation outcomes of universal family-focused preventive interventions: One- and two-year follow-ups of a controlled study [Invited article for Special issue: Alcohol and the family: Opportunities for prevention]. *J Stud Alcohol* 1999;(suppl. 13):103–111. [PubMed: 10096315]
44. Spoth RL, Redmond C, Trudeau L, Shin C. Longitudinal substance initiation outcomes for a universal preventive intervention combining family and school programs. *Psychol Addict Behav* 2002;16:129–134. [PubMed: 12079251]
45. Dishion, TJ.; Poulin, F.; Burraston, B. New directions for child and adolescent development. Vol. 91. Jossey-Bass; San Francisco, CA: 2001. Peer group dynamics associated with iatrogenic effects in group interventions with high-risk young adolescents. In DW Nangle, CA Erdley, eds. *The role of friendship in psychological adjustment.*; p. 79-92.
46. Murray DM, O'Connell CM, Schmid LA, Perry CL. The validity of smoking self-reports by adolescents: A reexamination of the bogus pipeline procedure. *Addict Behav* 1987;12:7–15. (1987). [PubMed: 3565116]
47. Altshuler SJ. Drug-endangered children need a collaborative community response. *Child Welfare J* March/April;2005 84(special issue):171–190.
48. Hall, JN.; Broderick, PM. Community networks for response to abuse outbreaks of methamphetamine and its analogs.. In: Miller, MA.; Kozel, NJ., editors. *Methamphetamine abuse: Epidemiologic issues and implications* [Electronic version] (National Institute on Drug Abuse Research Monograph Series, NIDA Research Monograph No. 115, DHHS Publication No. ADM 91-1836, pp. 109-120). National Institute on Drug Abuse; Alcohol, Drug Abuse, and Mental Health Administration; U.S. Department of Health and Human Services; Rockville, MD: 1991. Available [On-line]: <http://www.nida.nih.gov/pdf/monographs/115.pdf>

Figure 1.

Study participation summary

Note: Reported number of students assessed is the total for both cohorts.

Table 1Substance outcomes for 7th graders at 18 months past baseline: Multilevel ANCOVA results

Outcome	Intervention LS mean (SE)	Control LS mean (SE)	F value ^c (1, 12)	Effect size ^d Individual/community
Lifetime substance use indices ^a				
Substance initiation index-gateway	0.9917 (0.0229)	1.0610 (0.0231)	5.86 [*]	0.10 / 0.48
Substance use index-illicit	0.2576 (0.0182)	0.3337 (0.0183)	17.47 ^{**}	0.13 / 0.47
New user rates ^b				
Drinking alcohol (more than a few sips)	0.2530 (0.0123)	0.2703 (0.0130)	1.40	0.09 / 0.15
Drunkenness	0.0700 (0.0065)	0.0879 (0.0078)	3.74 ⁺	0.24 / 0.37
Cigarette use	0.1325 (0.0118)	0.1712 (0.0142)	4.56 ⁺	0.29 / 0.59
Marijuana use	0.0369 (0.0043)	0.0610 (0.0062)	20.61 ^{**}	0.51 / 0.62
Inhalant use	0.0616 (0.0056)	0.0808 (0.0069)	5.10 [*]	0.29 / 0.50
meth use	0.0062 (0.0013)	0.0121 (0.0022)	8.07 [*]	0.60 / 0.49
Ecstasy use	0.0066 (0.0016)	0.0133 (0.0027)	9.89 [*]	0.63 / 0.49
Past month user rates ^b				
Alcohol use	0.1785 (0.0111)	0.1929 (0.0117)	0.99	0.09 / 0.15
Cigarette use	0.0659 (0.0067)	0.0835 (0.0080)	3.48 ⁺	0.25 / 0.47
Past Year user rates ^b				
Drunkenness	0.0687 (0.0075)	0.0902 (0.0093)	4.67 ⁺	0.26 / 0.43
Marijuana use	0.0280 (0.0040)	0.0481 (0.0061)	19.90 ^{**}	0.53 / 0.66
inhalant use	0.0362 (0.0037)	0.0582 (0.0051)	13.31 ^{**}	0.49 / 0.74

LS, lifetime substance; SE, standard error

⁺ <0.10^{*} <0.05^{**} <0.01

^a PROC MIXED has been used for index outcomes. ANCOVA model has state, cohort, block, condition, and substance-related risk as factors; general child management is an individual-level covariate. Risk is a post-hoc variable.

^b For dichotomous outcomes, GLIMMIX macro procedures in SAS have been used. These analyses controlled for use prior to the pretest assessment by eliminating current users at pretest from the analyses.

^c Samples used for analysis of substance initiation indices and past month and year user rates are based on full Cohort 1 and 2 samples (*N*s range from 8292 to 8400 students, depending on number of missing responses); samples used for analysis of new user rates excluded students who reported prior use of the specific substance at the time of pretesting (*n*'s ranged from 7766, the number of students reporting that they had never drank more than a few sips of alcohol, to 8385, the number reporting they had never used methamphetamines).

^d Effect sizes are provided for both the individual level (based on the mixed model) and the community level. Community-level effect sizes (applying the standard effect size calculations to the community-level results) are relevant for assessing community-level public health impact; individual-level effect sizes may not adequately reflect intervention impact in intent-to-treat analyses because many individuals do not receive the full intervention.